

<b>BROOKHAVEN NATIONAL LABORATORY</b> Safety & Health Services Division  <b>INDUSTRIAL HYGIENE GROUP</b> Standard Operating Procedure		NUMBER <b>IH75910</b>
		REVISION <b>FINAL Rev1</b>
SUBJECT:                      LABORATORY PROCEDURE:  <b>Cylinder Valve Removal Technique</b>	DATE <b>02/01/06</b>	
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- 1.0 Purpose/Scope** This laboratory procedure documents the BNL mechanism for SAFELY removing the cylinder valve from empty calibration gas cylinders. This process allows the cylinders to be purged with compressed air or inert gas and rendered *non-hazardous* for disposal. The removal of the cylinder valve allows the empty cylinder to be disposed of as scrap metal rather than requiring processing through the hazard waste system.

The cylinder valve removing tool is designed to render the calibration gas cylinders incapable of being refilled by removing the valve assembly and leaving a visible hole in the cylinder valve area. This procedure is only applicable to the calibration gas cylinders used by the IH Group and does not necessarily apply to other compressed gas cylinders used by other organizations.

- 2.0 Responsibilities** This procedure will be implemented through the SHSD Industrial Hygiene Group. Only persons who thoroughly understand this procedure should conduct cylinder valve removal.

- 3.0 Definitions** *None*

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## 4.0 Prerequisites

- 4.1 **Hazard Assessment of area:** The removing of a cylinder valve may pose significant employee health risks from sudden pressure release. This SOP may be performed on cylinders that pose chemical health hazards. The hazards must be assessed on a case-by-case basis. Do not perform cylinder valve removal until a competent individual has assessed the hazards of the cylinder and determined valve removal can be done safely. This tool is to be used only on Cylinders that are empty and have not pressure.
- 4.2 **Personal Protective Equipment:** Appropriate personal protective equipment to protect the person must be used when implementing this procedure.
- **Eye:** Safety Glasses with side shields are required.
  - **Hand:** No hand covering is required for the chemicals in the SHSD inventory. If needed for a skin irritant or corrosive, disposable gloves, Exam-style, splash gloves are acceptable. Acceptable elastomers are: Nitrile, PVC, and Natural Rubber.
  - **Body:** No body PPE is required.
  - **Foot:** No foot PPE is required.
  - **Respiratory:** Under normal use, respiratory protection is not required because this operation must be conducted in a laboratory hood.
- 4.3 **Work Planning:** Follow the steps in this SOP to ensure requirements of work permits and work planning system reviews are met in performing this procedure.
- 4.4 **Environmental Impact and Waste Disposal:** The venting of the remaining gas in a calibration gas cylinder is done in the hood. It has insignificant adverse impact on the environment due to the very low concentration of contaminants in the calibration gas cylinders (typically low parts per million concentrations). This process does not create waste for disposal. The empty, valve removed, and air or inert gas purged cylinders are considered scrap metal and can be placed into metal recycling dumpsters.

## 5.0 Precautions

- 5.1 This operation must be done in a functioning laboratory hood to vent any calibration gas away from the breathing zone of the worker.

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- 5.2 Never attempt valve removal on a cylinder that is not EMPTY. Vent the remaining gas into the hood until the cylinder is completely empty.
- 5.3 Never attempt valve removal on a cylinder that is damaged.
- 5.4 Never attempt valve removal on a cylinder that contains a flammable concentration.
- 5.5 Never attempt valve removal on a cylinder that contains a corrosive or irritant gas without the prior review of the cylinder content and approval of the operation by the IH Group Leader.
- 5.6 Do not use the tool if it fails to engage properly with the cylinder threads, otherwise injury may occur.
- 5.7 Do not use wrenches or pliers to attach the tool to a cylinder. Hand tight only.

## 6.0 Procedure

### 6.1 Equipment:

- 6.1.1 Laboratory Hood
- 6.1.2 Ring Stand
- 6.1.3 Compressed Gas source and thin tubing for purging the container after valve removal, either compressed air, compressed nitrogen, or air from a pump.
- 6.1.4 **Air Liquide™ Cylinder Valve Removal Tool Model RC10** for use with calibration gas cylinders with external threads.
- 6.1.5 **Air Liquide™ Cylinder Valve Removal Model RC600** for use with calibration gas cylinders with internal threads.



### 6.2 Set up for Removal

- 6.2.1 The valve removal operation should be performed in an operating lab hood.
- 6.2.2 Cylinders must be EMPTY before using the valve removing tool. Cylinders with gas content must be relieved of all pressure prior to valve removal.

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Attach a gas cylinder regulator to gas cylinder, open regulator valve to release residual gas that may be left in the cylinder. When the cylinder is completely empty, remove the regulator.



### 6.3 Removal Technique

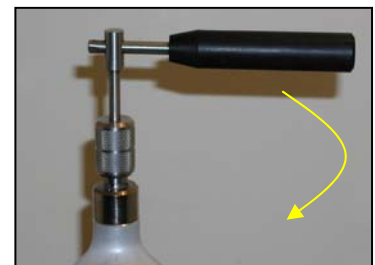
- 6.3.1 Secure the cylinder to a ring stand within the hood to safely hold the cylinder upright during the operation.
- 6.3.2 Determine cylinder type and applicable tool to use (internal or external thread).
- 6.3.3 Prepare the tool for use by making sure the center punch is retracted completely into the body of the tool before beginning. Turn it counter-clockwise until it stops.
- 6.3.4 Lower the hood sash to place the Plexiglas® between the cylinder valve and the worker's eyes.
- 6.3.5 Screw the tool on the cylinder as you would a regulator.
- 6.3.6 Once the tool is connected to the cylinder, slowly turn the handle clockwise until you have reached the end of its travel.



**Caution:** If venting occurs during this procedure, fully close the hood sash, move away from the hood, and allow the gas pressure to completely dissipate within the hood. Both tools are designed with gas relief ports in the event the cylinders contain residual gas.

Note: At this stage, the cylinder valve will have been pushed into the cylinder (you may hear when the valve falls into the cylinder).

- 6.3.7 Retract the tool and remove by turning counter clockwise.
- 6.3.8 Note: There will be a visible hole in the cylinder where the valve used to be if the process was successful.
- 6.3.9 Remove the tool from the cylinder by unscrewing it.
- 6.3.10 Purging hazardous cylinders. When the contents of the cylinder contained a concentration above the TLV or PEL:
  - 6.3.10.1 Connect a thin tube to a compressed nitrogen source or an air pump.
  - 6.3.10.2 Insert the tube into the cylinder hole.



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6.3.10.3 In a lab hood, purge the cylinder until the remaining contents is fully expelled from the cylinder by purging 10 times the cylinder volume.

6.3.11 Deface the cylinder content label and replace with a label "EMPTY."

6.3.12 Remove CMS Barcode label and fill out the *CMS Deletion* form to record the disposal of empty cylinders.

6.3.13 Place the empty cylinder in a metal recycling bin or dumpster.

## 7.0 Implementation and Training

### 7.1 Personnel Qualification

7.1.1 Only persons who thoroughly understand this procedure and have demonstrated competency to the satisfaction of their supervision should conduct this operation.

7.1.2 Only persons who thoroughly understand the hazards of the chemical cylinder and have completed training in Hazard Communication or Laboratory Standard may conduct this operation.

## 8.0 References

8.1 *Air Liquide™ Cylinder Valve Removal Tool Instruction Sheet*; PN 608; Rev Date 12/97.

## 9.0 Attachments

9.1 Air Liquide: Cylinder Valve Removing Tool Instruction Sheet

9.2 Cylinder Valve Removing Tool Safety Reminders

9.3 Job Performance Measure

## 10.0 Documentation

Document Development and Revision Control Tracking		
<b>PREPARED BY:</b> (Signature and date on file) R. Selvey SHSD IH Group Leader Date 12/26/02	<b>REVIEWED BY:</b> (Signature and date on file) R. Wilson SHSD IH Group Date 01/02/03	<b>APPROVED BY:</b> (Signature and date on file) R. Selvey SHSD IH Group Leader Date 01/02/03

The only official copy is on-line at the SHSD IH Group website.  
Before using a printed copy, verify that it is current by checking the document issue date on the website.

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ISM Review - Hazard Categorization <input type="checkbox"/> High <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Low/Skill of the craft	Validation: <input type="checkbox"/> Formal Walkthrough <input type="checkbox"/> Desk Top Review <input type="checkbox"/> SME Review Name / Date:	Implementation: Training Completed: Tracked in BTMS Procedure posted on Web: 11/02/05 Hard Copy files updated: 11/02/05

Revision Log		
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input checked="" type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Revised Section 1 to limit scope to IH Group cylinders.		
<i>(signature on file)</i> R. Selvey 02/01/06 SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change:		
<i>(signature on file)</i> SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:

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## Attachment 9.1

### Air Liquide: Cylinder Valve Removing Tool Instruction Sheet



#### CYLINDER VALVE REMOVING TOOL

for use with CALGAZ NON-FLAMMABLE CYLINDERS

Instructions cover the following Models:

**Model RC10 (external threads) for use with Calgaz 6D, 8AL, or 6DM cylinders**

**Model RC600 (internal threads) for use with Calgaz 7EOC, or 7HP cylinders**

#### READ ALL DIRECTIONS BEFORE PROCEEDING

Your Calgaz cylinder valve removing tool is designed to render the DOT 39 cylinders listed above incapable of being refilled by removing the valve assembly. This process will also leave a visible hole in the cylinder valve area. Empty cylinders may be returned to Air Liquide America prepaid or may be collected by local metal recycling companies. Air Liquide America only accepts cylinders of its own manufacture for recycling.

#### DIRECTIONS FOR USE:

1. Determine cylinder type and applicable tool to use.
2. Cylinders must be **EMPTY** before proceeding. Full cylinders must be safely relieved of pressure by use of a regulator before proceeding with deactivation of the valve. Some residual gas may escape during the procedure. Always wear safety glasses (included) and proceed slowly when working with the cylinders.
3. Hold cylinder with valve away from face. Use caution when working with calibration cylinders. If you are unfamiliar with their use, contact someone who is knowledgeable.

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## Attachment 9.2

### Cylinder Valve Removing Tool Safety Reminders

- 1) There are two cylinder valve removing tool models: Model RC10 for use with calibration gas cylinders with external threads and Model RC600 for use with calibration gas cylinders with internal threads.
- 2) The cylinder valve removing tool is designed to render the calibration gas cylinders incapable of being refilled by removing the valve assembly and leaving a visible hole in the cylinder valve area.
- 3) The valve removal operation should be performed in an operating fume / lab hood or in a well ventilated area.
- 4) Cylinders must be EMPTY before using the valve removing tool. Attach gas cylinder regulator to gas cylinder, open regulator valve to release residual gas that may be left in the cylinder. When the cylinder is completely empty remove the regulator.
- 5) Determine cylinder type and applicable tool to use (internal or external thread).
- 6) Prepare the tool for use by making sure the center punch is retracted completely into the body of the tool before beginning. Turning it counter clockwise until it stops retracts the center punch.
- 7) Screw the tool on the cylinder as you would a regulator. Once the tool is connected to the cylinder, slowly turn the handle clockwise until you have reached the end of its travel. The cylinder valve is pushed into the cylinder (you may hear when the valve falls into the cylinder).
- 8) If venting occurs during this procedure, pause to allow gas pressure to dissipate. Both tools are designed with gas relief ports in the event the cylinders contain residual gas.
- 9) Retract and remove the tool by turning counter clockwise. There will be a visible hole in the cylinder where the valve used to be.
- 10) Label the cylinder EMPTY/ DISPOSE and remove CMS Barcode.
- 11) Fill out required CMS forms before disposal of empty cylinders.

#### Warnings:

Do not use the tool if it fails to engage properly with the cylinder threads, otherwise injury may occur.

Do not use wrenches or pliers to attach the tool to a cylinder. Hand tight only.

Use the cylinder tools in a well- ventilated area.

Always wear safety glasses when using these tools.

Use caution when working with calibration gas cylinders.

## Cylinder Valve Removal Tool Job Performance Measure (JPM) Completion Certificate

<b>Candidate's Name</b>	<b>Life Number:</b>
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### Practical Skill Evaluation: Demonstration of Methodology

Criteria	Qualifying Performance Standard	Unsatisfactory	Reconsidered	Satisfactory
1. Hazard Analysis	Understands the hazard of the cylinders and potential exposure to the self as sampler and workers in the area.			
2. Location and Safety	Knows where equipment needed for the procedure is located and how to properly operate it.			
3. Using the Tool	Demonstrates the proper set up of the cylinder removal tool.			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

<b>Candidate Signature:</b>	<b>Date:</b>
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I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

<b>Evaluator Signature:</b>	<b>Date:</b>
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